Postdoc: Metagenomics and Metaproteomics of Intestinal Microbiota-Host and Microbiota-Diet Interactions

Job Description: The Kleiner Lab (https://kleinerlab.cals.ncsu.edu/) at NC State University is seeking an enthusiastic, highly motivated postdoctoral scholar to investigate the dynamics of gut microbiota function using advanced omics methods, such as shotgun metagenomics, proteomics and metaproteomics. The successful candidate will also perform *in vivo* and *in vitro* follow up studies to validate initial findings.

Potential research areas include:

- The effect of dietary components particularly protein on digestion and the gut microbiota in the context of host-health
- Investigate the dynamics and impacts of host-compound foraging by microbiota members
- The effects of probiotics, FMTs, and antibiotics on colonization, infection, and inflammation on the gut microbiota

Required Qualifications:

- A PhD in microbiology, biochemistry, genome science, analytical chemistry, bioinformatics or other relevant field.
- Experience analyzing advanced omics data, such as shotgun metagenomics data, RNA-seq, or LC-MS/MS based proteomics data.
- Expertise in a common scripting language such as bash, R, python, or Perl.
- Experience using common bioinformatics tools, such as those used for gene annotation, genome assembly, taxonomy assignment, differential expression analysis, or proteomics.
- Experience generating high-resolution publication quality graphics.
- Proven record of first author publication in reputable journals.
- Strong written and oral communication skills
- Be self-motivated and possess leadership skills

Preferred qualifications (things that we would love to have).

- A good understanding of microbial physiology, biochemistry, ecology and/or genomics
- Experience with common molecular biology techniques, such as heterologous gene expression, PCR, etc.
- Experience with sample prep methods for the extraction of DNA, proteins, or RNA.
- Experience with LC-MS/MS using orbitrap instruments (training can be provided by the lab if needed).
- Experience cultivating and manipulating anaerobic bacteria.

Responsibilities of the postdoctoral scholar will depend on their expertise and interests and could include design of mouse experiments with defined and/or isotopically labeled diets, cultivation of intestinal microbes *in vitro*, inoculation of germ-free mice with defined microbial communities, growth assays, quantification of microbial strains *in vivo*, and measurement of host and microbial gene expression responses using LC-MS/MS based metaproteomics. Metaproteomics data generation skills including operation of state-of-the-art high-resolution LC-MS/MS systems can be taught by the lab.

Several sets of human and mouse samples, as well as extensive datasets already exist and would be available for immediate analysis by the postdoc. Experience with the analysis of omics data particularly microbial gene expression data using python or R, as well as a thorough understanding of microbial metabolism and physiology would be a big plus.

The scholar will also have the opportunity to develop their own projects in the realm of intestinal microbiota studies. The scholar will have the opportunity to participate in both national and international collaborations involving a diversity of microbiomes related research areas. The scholar will also present results at conferences and lead the preparation of manuscripts. They will also participate in the supervision of graduate and undergraduate students.

What we offer: The Kleiner Lab studies the physiology and functional interactions in host-microbe systems. We develop cutting-edge mass spectrometry-based approaches to identify and quantify proteins and peptides in these systems. The Kleiner Lab has access to state of the art LC-MS/MS instrumentation including a RSLCnano and a Thermo Exploris 480 Q-Exactive type mass spectrometer. The scholar can also expect the opportunity to gain experience in other approaches related to intestinal microbiota and environmental microbiomes research, as well as professional development opportunities including grant writing and leadership workshops organized by the NCSU Office of Postdoctoral Affairs (https://grad.ncsu.edu/professional-development/opa/). This position is contingent on available funding; funding is currently anticipated for three (3) years.

The scholar will be embedded in a highly collaborative environment at NC State. For example the Kleiner Lab is part of the cluster for Microbiomes and Complex Microbial Communities at NC State (https://facultyclusters.ncsu.edu/clusters/microbiomes-and-complex-microbial-communities/), which provides a vibrant community of researchers in the area of microbiomes research and provide regular opportunities for seminars and networking. The lab is also involved in several large national and international funded projects, which provide plenty of opportunities for intellectual exchange, collaborations and networking. The lab is also active in the Center for Gastrointestinal Biology and Disease (CGIBD), which brings together scientists from UNC, Duke, and NCSU who do research on the gastrointestinal tract providing many opportunities for networking in the form of seminars, local conferences, and fellowships.

NC State, UNC Chapel Hill, and Duke are all located within a 30 minute drive of one another, and surround a large number of engineering, technology and biotech companies in Research Triangle Park. Together, the Research Triangle is one of the most dynamic places for academic and industrial research and development in the world. The main cities, Raleigh and Durham, are vibrant and cosmopolitan while still being affordable.

Screening of applicants will begin immediately and applications will be considered until the position is filled. Interested candidates should apply with a cover letter, addressed to us, with a brief statement of research interests, a CV and contact information for three references through the NC State job portal https://jobs.ncsu.edu/postings/178879. Inquiries about the position can be send to Dr. Manuel Kleiner (manuel_kleiner@ncsu.edu).